THE FEDERAL PLAN FOR METEOROLOGICAL SERVICES AND SUPPORTING RESEARCH
FISCAL YEAR 2007
EXECUTIVE SUMMARY

For Fiscal Year (FY) 2007, the President's budget requests over a total of $3.44 billion for meteorological services and supporting research. Of the requested total, over $3.03 billion is designated for operations and over $413.7 million for supporting research. Table ES-1 lists a breakout of the FY 2007 budget proposal.

For FY 2007, 92.7 percent of the total funds requested will go to the Departments of Commerce (DOC), Defense (DOD), and Transportation (DOT). The distribution among these three departments is DOC 59.3 percent, DOD 17.5 percent, and DOT 15.9 percent. The other Federal agencies will share the remaining 7.3 percent.

By comparison, the FY 2007 request represents an increase of 3.9 percent above the over $3.31 billion appropriated in FY 2006. Within the three major departments, DOC requests an increase of 4.2 percent; DOD an increase of 2.1 percent, and DOT an increase of 7.3 percent. The DOC increase is attributable to requests for increases by NWS, NESDIS, and NOS. The overall DOD increase is mainly the result of increases in AF and DMSP requested funding. DOT's increase is attributable to an increase in FAA's operations requests.

The budget requests for the other departments are as follows:

- Department of Agriculture (USDA) a decrease of 14.7 percent,
- Department of the Interior (DOI) no change,
- Environmental Protection Agency (EPA) no change,
- National Aeronautics and Space Administration (NASA) an increase of 2.2 percent, and
- the Nuclear Regulatory Commission (NRC) no change.

Figure ES-1 depicts each agency's proportion of the requested FY 2007 Federal budget for meteorological operations and supporting research. Each agency's portion of the requested funding for meteorological operations is shown in Figure ES-2. Of the over $3.03 billion requested for meteorological operations, DOC, DOD, and DOT account for 98.6 percent of the funds. Overall, operational costs increased by 5.6 percent. Figure ES-3 depicts each agency's portion of the proposed Federal supporting research budget. Unlike operations, DOC, DOD, and NASA account for the major share (83.5 percent) of the supporting research budget. Overall, supporting research costs decreased by 7.5 percent.

All agencies project a personnel total of 13,505 full-time equivalent (FTE) to be employed in Federal meteorological operations in FY 2007. This figure represents a decrease of 13.5 percent from the 15,613 FTE employed in FY 2006, with the largest share of the decrease attributed to a reduction in DOT/FAA personnel due to outsourcing activities.

Table ES-1. Federal Budget for Meteorological Operations and Supporting Research, FY 2007 (in thousands of dollars)

Agency	Operations	% of TOTAL	Supporting Research	% of TOTAL	TOTAL	% of TOTAL
Agriculture	$19,710	0.7	$31,395	7.6	$51,105	1.5
Commerce	1,954,209	64.5	89,787	21.7	2,043,996	59.3
Defense	514,056	17.0	89,369	21.6	603,425	17.5
Homeland Security	20,110	0.7	0	0.0	20,110	0.6
Interior	2,400	0.1	0	0.0	2,400	0.1
Transportation	518,624	17.1	27,800	6.7	546,424	15.9
EPA	0	0.0	9,000	2.2	9,000	0.3
NASA	2,463	0.1	166,400	40.2	168,863	4.9
NRC	120	0.0	0	0.0	120	0.0
TOTAL	$3,031,692	100.0*	$413,751	100.0	$3,445,443	100.0*

* Column total does not exactly equal 100 percent due to rounding for several agencies.

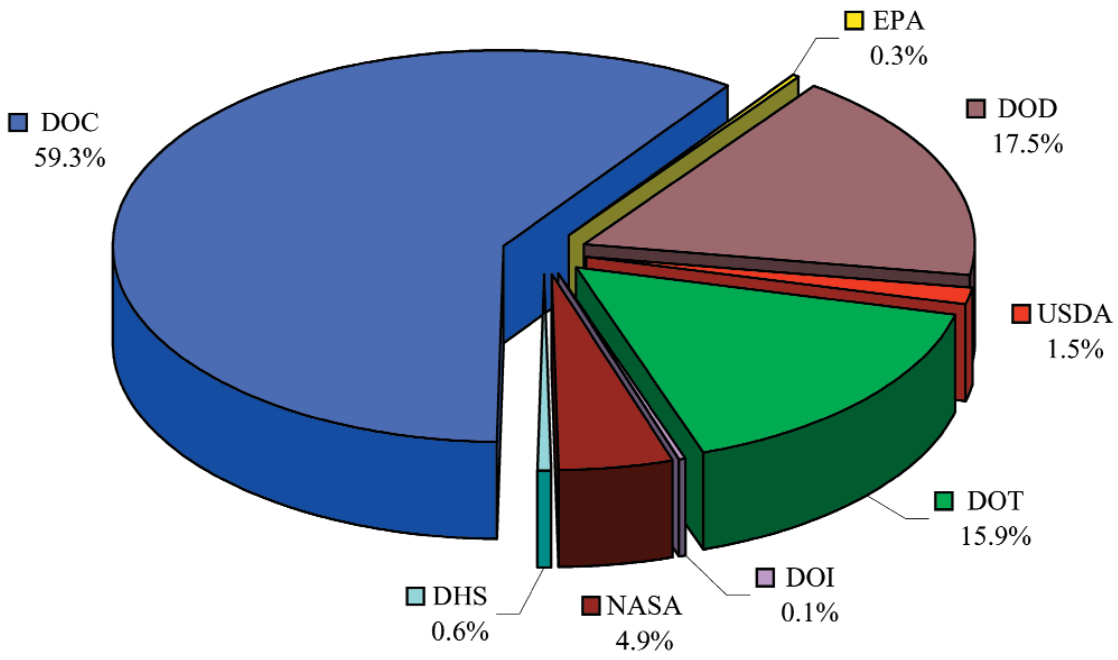

Figure ES-1. Agency Percent of Total Federal Budget for Meteorological Operations and Supporting Research, FY 2007.

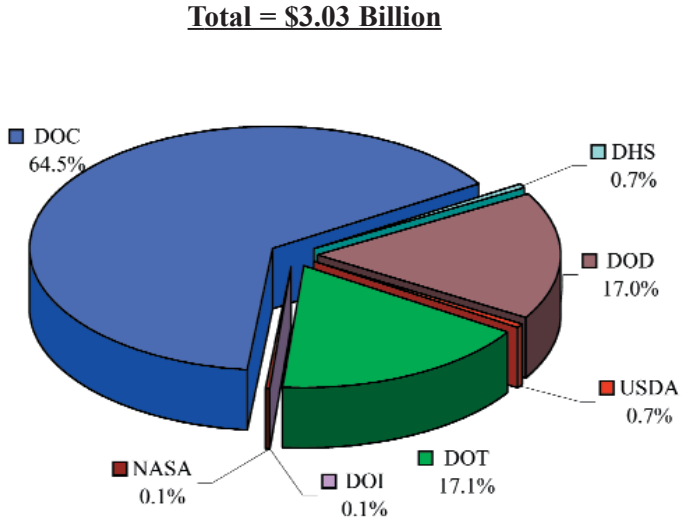

Figure ES-2. Agency Percent of Federal Budget for Meteorological Operations, FY 2007.

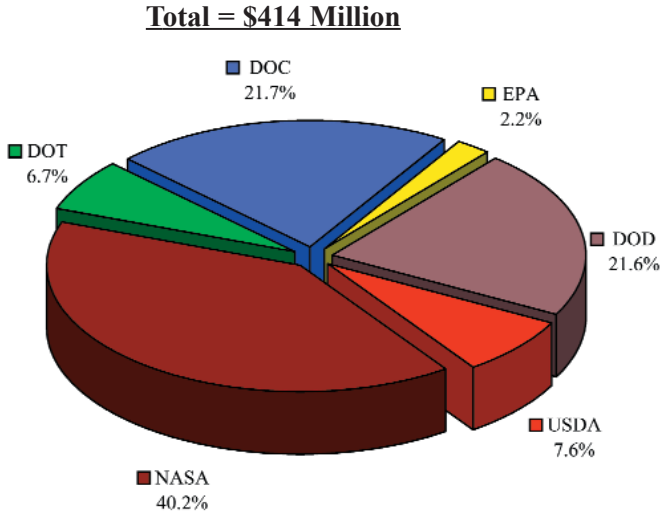

Figure ES-3. Agency Percent of Federal Budget for Supporting Research, FY 2007.

MAJOR PROGRAMS--DOC, DOD, and DOT

NEXT GENERATION WEATHER RADAR (NEXRAD)

The NEXRAD Program, begun in FY 1981, was responsible for procurement, installation, and operation of the Weather Surveillance Radar-1988 Doppler (WSR-88D). The first limited production WSR-88D system was installed at Norman, Oklahoma, in May 1990, and commissioned in February 1994. In response to a National Research Council report, three additional radars were added to the original program plan, raising the total to 158. The last system in the basic procurement schedule was installed in December 1996.

By agency, DOC/National Weather Service commissioned 120 sites, DOD (USAF) commissioned 26 sites (Continental United States (CONUS) and overseas), and DOT/FAA commissioned 12 sites. DOC/NWS has two each systems at the National Reconditioning Center and the NWS Training Center, in Kansas City, Missouri, and the Radar Operation Center, Norman, Oklahoma. DOD has two systems at Keesler AFB, Mississippi, for training.

AUTOMATED SURFACE OBSERVING SYSTEM (ASOS)

The ASOS program began in 1983 as a joint development effort between the DOC, DOD, and DOT/FAA. ASOS installation started in 1992. To date, 1009 units have been purchased, accepted, and commissioned: 313 by NWS, 572 by FAA (accepted and commissioned by the NWS), 77 by the Navy, and 47 by the Air Force. The Air Force Observing System-21st Century (OS-21) program is providing a state-of-the-art life-cycle replacement for Air Force observing equipment. OS-21 includes five different configurations: fixed, deployable, remote, manual, and upper air. Installation of 110 fixed systems, designated the FMQ-19, at Air Force bases and Army posts worldwide began in summer 2002, and is scheduled for completion in 2007. The manual version is intended for tactical operations and will continue upgrades begun under the Manual Observing System and Tactical Meteorological Observing System modification programs.

In support of operations in Kosovo, the Air Force purchased commercial off-the-shelf (COTS) remote miniature weather sensors to provide accurate real-time weather information from forward unmanned locations and has since deployed remote miniature sensors to Afghanistan and Iraq.

AUTOMATED WEATHER INFORMATION SYSTEMS (AWlS)

The DOC, DOD, and DOT require AWISs to facilitate the collection, processing, and interpretation of meteorological data. AWISs are being procured to provide an automated, high-speed, user-friendly man/machine interface to access and process large volumes of sophisticated meteorological data. AWIS supports timely production of accurate and geographically precise warnings, forecasts, and specially tailored products while including a communications capability to facilitate expeditious dissemination.

Major agency systems classified as AWISs are: NOAA's Advanced Weather Interactive Processing System (AWIPS), FAA's Weather and Radar Processor (WARP), Air Force's Joint Environmental Toolkit (JET), and the Navy's Naval Integrated Tactical Environmental Subsystem (NITES).

Advanced Weather Interactive Processing System (AWIPS)

In February 1997, the Secretary of Commerce approved the limited deployment of AWIPS at over 40 sites. On April 9, 1998, the Secretary authorized full-scale production and deployment of AWIPS, through Build 4.2, for the remaining 95 systems. Installation of these 95 systems began in September 1998 and was completed in June 1999. An Operational Test and Evaluation of the commissioning software load (Release 4.2) was successfully conducted from mid-May through June 1999. AWIPS commissioning began in January 2000, was completed in November 2000, with 139 NWS systems commissioned at 122 Weather Forecast Offices (WFOs), 13 River Forecast Centers (RFCs), the Spaceflight Meteorology Group (SMG), and 4 National Centers for Environmental Prediction (NCEP).

The NWS successfully completed the final development phase release of AWIPS (Build 5) in early 2003, completed deployment of its first Operational Build (OB1) that summer, completed deployments of OB2 in December 2003, OB3 in August 2004, OB4 in February 2005, and OB5 in December 2005. Deployment of Operational Builds continue at about two per year. The Operational Builds deliver new functionalities and enhancements in the areas of warning product generation and warning support, hydrological product generation, data and imagery display, communications and infrastructure. Of note within the operational builds of AWIPS, is an evolution of the architecture to the Linux open source operating environment which was started in 2001, and will continue through to its planned completion in early 2007.

WARP

The FAA's WARP will greatly enhance the dissemination of aviation weather information throughout the National Airspace System (NAS). WARP will automatically create unique regional, WSR-88D-based mosaic products and send these products, along with other time-critical weather information, to controllers through the Advanced Automation System (AAS), as well as to pilots via the aeronautical data link.

JET

JET will replace several disparate

legacy weather systems with a single, integrated means of supporting both garrison and deployed operations, including a "first-in" weather forecasting capability. Combining forecasting, product-tailoring, and mission-impact capabilities in an interactive, network-centric, standards-based package; JET accesses, processes, analyzes, tailors, and integrates terrestrial and space weather information into command and control systems to guide warfighter decision-making. This effort will eliminate Air Force Weather Weapon System (AFWWS) redundancies and inefficiencies, reduce the burden on system administrators, and ultimately extend, consolidate, or replace the following systems: Operational Weather Squadron (OWS) Production System Phase II (OPS II); the New-Tactical Forecast System (N-TFS); the Joint Weather Impacts System (JWIS); and the Army's Integrated Meteorological System (IMETS) weather toolkit.

NITES

The current series of NITES (I-IV) were reengineered from the Tactical Environmental Surveillance System (TESS) and other legacy systems of the early 1990's. These NITES systems are fielded through FY 2010 and have various capabilities to ingest, process, fuse, display, and disseminate METOC information and its impact on tactical operations. In early 2000, the NITES II application software was redesigned to align with the Global Command and Control System (GCCS) Family of Systems (FoS) 4.x, provide increased flexibility, enable operating system/hardware independence, and improve user operability with a new graphical-user interface (GUI) for tactical decision aid applications. The NITES II Redesign (N2R) suite of software is integrated with both GCCS-Maritime (M) and GCC S-Joint (J) 4.x versions.

The Navy is currently reviewing the requirement to field a follow-on system, called "*NITES - Next*", to increase the capabilities for ashore, afloat and mobile METOC support to naval tactical operations and be interoperable with the other services. *NITES - Next* would have four components including: tactical applications, a forecaster's toolkit, a data services package, and the ability to collect METOC information through organic sensors for rapid environment analyses. *NITES - Next* will interface with the data providers/users using Web services and take advantage of the future DOD Global Information Grid (GIG) and Navy FORCEnet architectures. Navy is also analyzing how to efficiently and effectively leverage the Air Force's Joint Environmental Toolkit (JET) Program for meteorological and environmental impact support.

NATIONAL POLAR-ORBITING OPERATIONAL ENVIRONMENTAL SATELLITE SYSTEM (NPOESS)

On October 3, 1994, NOAA, DOD, and the National Aeronautics and Space Administration (NASA) combined the nation's military and civilian environmental satellite programs and created an Integrated Program Office (IPO) to develop, manage, acquire, and operate the national polar-orbiting meteorological satellite system, subsequently designated the National Polar-orbiting Operational Environmental Satellite System (NPOESS). The IPO is organizationally located within NOAA and is headed by a System Program Director responsible to the NPOESS Executive Committee. This committee, which consists of the Under Secretary of Commerce for Oceans and Atmosphere, the Under Secretary of the Air Force, and the NASA Deputy Administrator serves as a board of directors to ensure that overall program plans also meet the individual needs of the three participating agencies.

The IPO concept provides each of the participating agencies with lead responsibility for one of three primary functional areas. NOAA has overall responsibility for the converged system and is responsible to the IPO for satellite operations. NOAA is also the primary interface with the international and civil user communities. DoD is responsible to support the IPO for major systems acquisitions including launch support. NASA has a primary responsibility for facilitating the development and incorporation of new cost-effective technologies into the converged system. Although each agency provides certain key personnel in their lead role, each functional division is staffed by tri-agency work teams to maintain the integrated approach.

Pursuant to section 2433 of title 10, United States Code, Congress was notified on September 28, 2005 that NPOESS Program Acquisition Unit Cost (PAUC) would be exceeded by 15 percent. Since the fall of 2005, the fundamental management structure of the management chain at the IPO has been changed to improve the lines of communication and reporting. A Program Executive Office (PEO) organization has been added to work interagency and external activities which allows the System Program Director to focus on the acquisition process. After further cost and alternatives were analyzed, a subsequent certification notification went to Congress on January 12, 2006 indicating cost growth of greater than 25 percent. This notification begins the Nunn-McCurdy certification process, which requires the Under Secretary of Defense (USD) for Acquisition, Technology and Logistics (AT&L) certify to Congress that:

- Such acquisition program is essential to national security;
- There are no alternatives that provide equal or greater military capability at less cost;
- The new estimates of the program costs are reasonable; and
- The management structure for the program is adequate to manage and control costs.

On June 5, 2006 the Under Secretary of Commerce for Oceans and Atmosphere, the Administrator of NASA and the Under Secretary of Defense (AT&L) agreed to restructure the NPOESS program. The USD (AT&L) certifies that with respect to the restructured NPOESS program that:

- Such acquisition program is essential to the national security;
- There are no alternatives to such acquisition program which will provide equal or greater military capability at less cost;
- The new estimates of the program acquisition unit cost or procurement unit cost for such program are reasonable; and
- The management structure for such acquisition program is adequate to manage and control program acquisition unit cost or procurement unit cost.

As restructured the NPOESS includes two Engineering and Manufacturing Development (EMD) satellites, with the option in FY 2010, of exercising a renegotiated procurement option for two additional NPOESS satellites. The restructured program includes the Visible/Infrared Imager/Radiometer Suite (VIIRS); Microwave Imager/Sounder; Search and Rescue Satellite Aided Tracking (SARSAT); Cross-track Infrared Sounder (CrIS); Advanced Technology Microwave Sounder (ATMS); Advanced Data Collection System (ADCS); Cloud and Earth Radiant Energy System (CERES) [to be flown on satellite C-1 only]; Ozone Mapping and Profile Suite (OMPS) - Nadir; and the Space Environment Monitor (SEM). The Conical Scanning Microwave Imager/Sounder (CMIS) is terminated while developing a competition for a new Microwave Imager/Sounder starting with the second EMD satellite.

Funding is not available for the Aerosol Polarimetry Sensor (APS); Total Solar Irradiance Sensor (TSIS); OMPS-Limb; Earth Radiation Budget Suite (ERBS); Altimeter (Alt); Survivability Sensor (SuS); and the Full Space Environment Sensors (SESS). However, the program will plan and fund for integration of these sensors onto the NPOESS satellite buses, if the sensors are provided from outside the program.

NPOESS is a two-orbit rather than three-orbit program that uses data from the European Meteorological Operational (METOP) satellites provided by the European Organization for the Exploitation of Meteorological Satellites (EUMETSAT) for the mid-morning orbit, while providing flexibility to deploy Defense Meteorological Satellite Program (DMSP) satellites depending on the health of the constellation in either early-morning or mid-morning orbits. The launch schedule for the restructured program is as follows:

- NPOESS Preparatory Project (NPP) - January 2010;
- Two EMD satellites (C-1 - January 2013 and C-2 January 2016); and
- An option in FY 2010 for block upgrade satellites (C-3--January 2018 and C-4--January 2020).

The restructured program provides for continuity of existing programs, constellation management flexibility, and the most capability for the least cost, while maintaining growth potential to achieve the original capability envisioned for NPOESS.

OTHER AGENCY PROGRAMS

For FY 2007, the Department of Agriculture (USDA) requested $51.1 million for meteorological operations and supporting research. Operationally, the USDA supports specialized weather observation networks and also conducts an active supporting research program to ensure an abundance of high-quality agricultural commodities, while minimizing the adverse effects of agriculture on the environment. Under supporting research, USDA focuses on the interactions of weather and climate with plant and animal production and water resources management.

The Department of the Interior's (DOI) FY 2006 request of $2.4 million is primarily to support the Bureau of Land Management's Remote Automatic Weather Station (RAWS) program.

The Environmental Protection Agency (EPA) budget request for FY 2007 is $9.0 million, the same amount as in FY 2006, to provide user-appropriate and scientifically credible air-quality and meteorological programs and models to support regulatory applications.

NASA's FY 2007 request is for just over a total of $168.8 million--over $2.4 million for operations and over $166.4 million for supporting research. These funding levels are composed of the estimated meteorology share of the supporting research and analysis programs as well as Earth Observing System (EOS) and Earth Probe instruments, EOS science, and the EOS Data Information System elements of the NASA Office of Earth Science budget.

The Nuclear Regulatory Commission's (NRC's) request for $120,000 in FY 2007 is for operations. The NRC will dedicate these funds to obtain and analyze meteorological data and information related to siting new nuclear power plants and safe operation of nuclear facilities, to the protection of public health and safety, and protection of the environment.

FEDERAL COORDINATION (See Appendix A for complete details.)

NATURAL DISASTER REDUCTION

INTERDEPARTMENTAL HURRICANE CONFERENCE

The OFCM annually hosts the Interdepartmental Hurricane Conference (IHC) to provide a forum for the responsible federal agencies, together

with representatives of the user communities such as emergency management, to review the nation's hurricane forecast and warning program and to make recommendations on how to improve the program. The OFCM hosted the 60th IHC in Mobile, Alabama, March 20-24, 2006. The theme of the 2006 conference was *Hurricane Season 2006: Building on the Historic 2005 Season*. The conference attendance was more than 240; for the seventh consecutive year, attendance has exceeded 200. VADM Conrad C. Lautenbacher, Jr., USN (Ret.), Under Secretary of Commerce for Oceans and Atmosphere and Administrator of the National Oceanic and Atmospheric Administration (NOAA), set the tone for the meeting during his Monday afternoon keynote address-Power of Partnerships: Prediction and Protection, noting that the only way to protect lives, property, and the economic well-being of our citizens is through partnerships. As a result, the importance of building partnerships became the central theme of the conference which the attendees took to heart. Actions resulting from the conference are: (1) publish the *2006 National Hurricane Operations Plan*; (2) through the Joint Action Group for Tropical Cyclone Research (JAG/TCR), further refine the draft strategic research plan for tropical cyclones based on the input received during the 60th IHC workshop; (3) develop a Strategic Plan for Improved Tropical Cyclone Reconnaissance Systems (ITCRS) (manned, unmanned, space-based, etc.); (4) facilitate bringing together the Web site owners from NOAA (e.g., Hurricane Research Division, National Hurricane Center), Navy, etc., to improve linkages for supporting research and development; and (5) adopt recommendations for action in a comprehensive effort to improve *getting the "right" message to the customer*. In May 2006, the 44th edition of the *National Hurricane Operations Plan (NHOP)*, which provides the basis for hurricane reconnaissance for the 2006 season and details federal agency responsibilities, operations, and procedures; products; aircraft, satellite, radar, and buoy data collection; and marine weather broadcasts, was published based on the inputs and discussions from the 60th IHC.

TROPICAL CYCLONE RESEARCH AND DEVELOPMENT PLAN

Actions from previous meetings of the Interdepartmental Committee for Meteorological Services and Supporting Research (ICMSSR) and Interdepartmental Hurricane Conferences (IHC) called for the preparation of a tropical cyclone strategic research plan. This is being accomplished by the OFCM Joint Action Group for Tropical Cyclone Research (JAG/TCR). OFCM will publish the *Interagency Strategic Research Plan for Tropical Cyclones: The Way Ahead* in fall 2006. It will then focus on development of a *Strategic Plan for Improved Tropical Cyclone Reconnaissance Systems* (manned, unmanned, space-based, etc.).

NATIONAL HURRICANE CONFERENCE

OFCM participated in the 28th Annual National Hurricane Conference (NHC) in Orlando, Florida, April 10-14, 2006. On April 11, OFCM conducted a training session in conjunction with the conference. The theme of the training session was *Warning Messages: Improving Response*. The training session focused on hurricane messages and communication, and introduced a new proposed communications model that reflects the divergent information needs of various users. Approximately 200 conference attendees participated in the training session, which validated the need to revisit the warning process. It was also emphasized that the results of social science research need to be an integral part of the hurricane forecast and warning program.

POST-STORM DATA ACQUISITION

The OFCM continued to coordinate, as required, timely post-storm data acquisition surveys in response to Presidentially declared natural disasters and other agency requirements to evaluate, for example, the impact on the coastal ecosystems. These natural disaster reduction efforts contribute to the determination of the intensity and magnitude of storms, and, in many cases, help to determine the extent of damage for use in Presidential disaster declarations. In FY 2006, post-storm surveys were conducted for Hurricane Rita and after the April 7, 2006, tornado outbreak in central Tennessee.

URBAN METEOROLOGY

NATIONAL WILDLAND FIRE WEATHER NEEDS ASSESSMENT

An important contribution to urban meteorology during the period of this report is related to the National Wildland Fire Weather Needs Assessment which is being conducted by OFCM. The formation of the Joint Action Group for National Wildland Fire Weather Needs Assessment (JAG/NWFWNA) and conduct of the assessment is responsive to ICMSSR Action Item 2005-1.1 where ICMSSR "concurred that OFCM should move forward to form a Joint Action Group (JAG) under the Committee for Environmental Services, Operations, and Research Needs (CESORN), to review the needs and requirements for wildland fire weather information, to include identifying organizational responsibilities and addressing the following issues: data collection, fire weather research, weather forecast services, data assimilation, air quality, information dissemination, education and outreach, and user response." An abundance of accumulated biomass in

forests and rangelands, persistent drought conditions, and encroaching urbanization are contributing to larger, more costly wildland fires; and to effectively manage and suppress wildland fires, fire managers need timely, accurate, and detailed fire weather and climate information. An important benchmark is the June 2005 Western Governors' Association (WGA) meeting where they approved Policy Resolution 05-04: National Wildland Fire Weather Program. Within the policy, the WGA urged NOAA to have the OFCM complete a National Needs Assessment Report of federal, state, and local fire managers' needs for weather information in their wildfire and prescribed fire decision making processes and a framework to meet those needs by the National Weather Service and Predictive Services. The JAG/NWFWNA was established in December 2005 and has moved forward to conduct the assessment.

ATMOSPHERIC TRANSPORT AND DIFFUSION RESEARCH AND DEVELOPMENT

OFCM developed an atmospheric transport and diffusion (ATD) implementation strategy for the recommendations for which OFCM has primary responsibility in the *Federal Research Needs and Priorities for Atmospheric Transport and Diffusion Modeling* (September 2004) report. In accordance with this, OFCM formed a Joint Action Group for the Joint Urban Test Beds (JAG/JUTB) under the Working Group for Urban Meteorology (WG/UM); and this joint action group is continuing work to develop an operational concept document for multifunctional joint urban test beds to provide services and data to model developers, test and evaluation personnel, and users.

CLIMATE

OFCM supports the U.S. Climate Change Science Program (CCSP). OFCM arranged for Dr. James R. Mahoney, former Director of the CCSP, to brief the Federal Committee for Meteorological Services and Supporting Research (FCMSSR) so that member agencies can stay abreast of the program and coordinate priorities for atmospheric requirements through OFCM for inclusion in CCSP. Further, OFCM used its infrastructure to reach out and invite many government, private, and academic individuals to attend the November 14-16, 2005, *CCSP Climate Science in Support of Decision Making* workshop, and this resulted in substantially increased attendance of the workshop; and OFCM provided interagency funding support for an evening poster session of the workshop. OFCM also prepared results of a Climate Services Survey to identify new climate products and services that have been developed and implemented since the Board on Atmospheric Sciences and Climate defined "climate services" in 2001 as "the timely production and delivery of useful climate data, information, and knowledge to decision makers."

OPERATIONAL PROCESSING

OFCM's activities regarding Operational Processing Centers (OPC) continue opportunities to improve processing and backup capabilities of NOAA's National Centers for Environmental Prediction and Office of Satellite Data Processing and Distribution, the Air Force Weather Agency, and the U.S. Navy's Fleet Numerical Meteorology and Oceanography Center and Naval Oceanographic Office. Efforts continue to improve backup support and capabilities and to coordinate preparation for the implementation of the Weather Research and Forecasting (WRF) modeling system, in accordance with the *National Concept of Operations Framework for the Operational Processing Centers*, which is contained in an April 1, 2004, memorandum of agreement signed by the directors of the OPC's. Of particular significance during this period is the establishment of a National Operational Processing Centers (NOPC) Program Council within the OFCM coordinating infrastructure, to help achieve national priorities by focusing agency efforts and leverage resources to gain the maximum return.

ANNUAL FEDERAL PLAN

In October 2005, the OFCM issued *The Federal Plan for Meteorological Services and Supporting Research-Fiscal Year 2006*. The Federal Plan is congressionally mandated and is a one-of-a-kind document which articulates the meteorological services provided and supporting research conducted by agencies of the federal government. The Federal Plan helps to reduce overlap and duplication among the agencies. It is a comprehensive publication that documents proposed programs for FY 2006 and reviews agency programs in FY 2005.

WEATHER INFORMATION FOR SURFACE TRANSPORTATION

Since 1998, OFCM has made weather services and research and development (R&D) activities supporting the surface transportation community a priority for the federal meteorological community. In December 2002, OFCM published the comprehensive report, *Weather Information for Surface Transportation-National Needs Assessment Report*, which provides the first ever compilation and analysis of weather support needs across six surface transportation sectors (roadway, railway, transit, marine transportation, pipeline systems, and airport ground operations). In August 2004, OFCM established the Working Group for Weather Information for Surface Transportation (WG/WIST) to develop both a WIST R&D Plan and a WIST Implementation Plan. In August 2006, OFCM published the report, *Weather Information for Surface*

Transportation-Update on Weather Impacts and WIST Results. This update focuses on the status of transportation weather issues in the nation and the results achieved since the first WIST report in 2002. It also highlights areas where further steps can be made in the near term.

AVIATION WEATHER

A project which is underway in the area of aviation weather support includes the development of *The National Volcanic Ash Operations Plan for Aviation and Support of the International Civil Aviation Organization International Airways Volcano Watch (NVOPA)*. This plan, projected be completed in the fall of 2006, is the national operations plan in support of observing, tracking, monitoring, forecasting and reporting volcanic ash in the atmosphere that affects the safety of flight operations in the U.S. National Airspace System (NAS). It identifies the federal agencies that implement these actions and describes their responsibilities, procedures, actions, and message formats.

The OFCM continues to facilitate the continuation of interagency funding for the acquisition of automated meteorological observations from aircraft in partnership with several major U.S. commercial airlines.

The OFCM continued to implement the National Aviation Weather Program during FY 2006. The federal interagency *National Aviation Weather Program* has resulted in a major reduction of weather-related accidents. The program remains on track toward meeting the established goal to reduce weather-related accidents by 80 percent by 2007. The OFCM continues to monitor progress in meeting this goal by monitoring weather-related aviation accident events and trends. *A National Aviation Weather Program Mid-Course Assessment* was completed in August 2003. OFCM will complete a final assessment in 2007, the ten year point of the National Aviation Weather Program.

SPACE WEATHER

It was noted at the November 16, 2004, and December 1, 2004, meetings of the Interdepartmental Committee for Meteorological Services and Supporting Research (ICMSSR) and Federal Committee for Meteorological Services and Supporting Research (FCMSSR), respectively, that the National Space Weather Program (NSWP) was nearing the end of its 10-year period to accomplish its overarching goal to achieve an active, synergistic, interagency system; providing timely, accurate, and reliable space weather warnings, observations, specifications, and forecasts by 2007. It was also noted that it was time to perform an interagency assessment to look at the progress toward meeting its goals. A National Space Weather Program Assessment Committee was formed by OFCM to perform the assessment, which was led by Dr. Louis J. Lanzerotti, Distinguished Research Professor, Center for Solar-Terrestrial Research, New Jersey Institute of Technology.

In its *Report of the Assessment Committee for the National Space Weather Program* (June 2006), the Assessment Committee concluded that, since the program's inception in 1995, it has had a number of noteworthy achievements, most of which likely would not have been attained without the program's existence. The committee also found shortfalls in the program. Based on the conclusions of the committee as contained in the report, continuation of the NSWP is strongly warranted because of the enormous potential to enhance the nation's space weather mission over the next 10 years through improved operational capabilities, which capitalize on the transition of innovative research. The committee made specific recommendations to further strengthen the NSWP in four key areas.

It was agreed that the *Report of the Assessment Committee for the National Space Weather Program* should proceed for consideration by the National Space Weather Program Council (NSWPC), and that the Program Council should be the executive agent for FCMSSR for continuing activities in this area.

PHASED ARRAY RADAR

The OFCM Joint Action Group for Phased Array Radar Project (JAG/PARP) recently completed the report, *Federal Research and Development Needs and Priorities for Phased Array Radar* (June 2006). In the MPAR national vision, the National Radar Network will be the critical observing system supporting public safety, homeland security, and the transportation sector for decades to come; there is a need to replace the aging fleet of 526 conventional mechanically scanning radars over the next 20 years with 300+ MPAR radars; MPAR can provide simultaneous air and weather surveillance from a single radar site; and with the consolidation of multiple single-mission radars into MPAR we can reduce the national radar fleet by more than 40 percent. The JAG/PARP has determined that MPAR has the potential to exceed present radar capabilities and meet stated user needs; there would be a significant increase in tornado lead times; there are no serious hardware technical challenges; and a 7- to 10-year intensive research and development effort will be required, and the estimated cost of this is $200 million.

The report *Federal Research and Development Needs and Priorities for Phased Array Radar* estimated needed research and development funding to be $215 million over 9 years to meet the replacement opportunity. This would support the research needed to reduce risk, determine the capability of MPAR to meet multiple user needs

concurrently, develop a full MPAR prototype, and perform a cost analysis to determine system affordability.

ATMOSPHERIC RESEARCH AND DATA ASSIMILATION/DATA MANAGEMENT

Advances in data assimilation are key to meeting virtually any forecast goal relating to model performance. It was stated in the *Strategic Plan for the U.S. Integrated Earth Observation System* (April 2005) that "In order to take the 'pulse of the planet,' we must establish a valid end-to-end process that will take us from observations to user-related products. Scientific needs for this end-to-end process require that we … assimilate the Earth observation data streams into models (eventually in real time) …" and "Data assimilation may be the most critical path through which advances in forecasting convective precipitation will be modulated." At its November 16, 2004, meeting, the Interdepartmental Committee for Meteorological Services and Supporting Research (ICMSSR) supported action to examine gaps in data assimilation and data management capability, articulate challenges that lie ahead in meeting future requirements, and propose strategy to address gaps in capability and future challenges.

The data assimilation survey and follow-on strategy was briefed at the July 18, 2006, ICMSSR meeting. It was noted that the focus of the report which is being prepared is on data assimilation for the purpose of improving forecast skill of a numerical weather prediction (NWP) model; the scope of data assimilation is restricted to incorporation of observational data as a forcing factor in cycles of forward NWP models; and broader definition of data assimilation would be addressed through inclusion of related activities such as climate reanalysis, trace constituent monitoring, and air quality.

Data gathering and data assimilation activity analysis tasks are essentially complete; the report framework and key issues have been defined by the data assimilation group; and next steps are being defined. The report, *Federal Meteorological Data Assimilation Capabilities*, will be published in the fall of 2006.

ENVIRONMENTAL LITERACY

OFCM has laid out a vision, framework, and methodology which the office will embrace to systematically promote and execute environmental literacy through interdepartmental collaboration within the OFCM coordinating infrastructure. The methodology defines how to determine if an opportunity to promote environmental literacy exists. It also describes the method to be used to determine the target public, private, and/or academic sector audiences and how to reach them. The OFCM developed an implementing strategy/action plan to make environmental literacy a crosscutting priority within the OFCM coordinating infrastructure. *An Implementing Strategy for Promoting Environmental Literacy as an OFCM Crosscutting Priority* was presented to the science community at the American Geophysical Union (AGU) Fall Meeting, December 5-9, 2005, in San Francisco, California.

FREQUENCY MANAGEMENT

Both international and domestic spectrum policy are of critical importance to the federal meteorological community and can significantly impact our ability to carry out our assigned duties and responsibilities. The OFCM Working Group for Frequency (Radio Spectrum) Management (WG/FM) acts as a two-way clearinghouse for information on environmental use of the radio spectrum. It fosters cooperation and coordination among federal agencies for the collection and consolidation of agency needs and requirements related to frequency management issues as they affect meteorological services, and planned non-environmental spectrum uses that may affect the environmental community for good or ill. During the first quarter of FY 2006, OFCM updated its frequency management issues document to provide the interagency community with background information, current status of meteorological uses, potential future technology that could impact spectrum bandwidth, identification of other new frequency management issues, and recommendations for agency involvement in the radio spectrum area.

GUIDANCE AND PRACTICES FOR XML

The recently formed Committee for Environmental Information Systems and Communications (CEISC) Joint Action Group for Extensible Markup Language and Web Services (JAG/XMLWS) reviewed the members' current Meteorological and Oceanographic (METOC) XML implementations and agreed to use DOD's Joint METOC Broker Language (JMBL) as a starting point for a U.S. position. A *Report on the use of XML within the U.S.* was presented to the Expert Team on Data Representation and Codes (ET/DR&C) at its meeting May 8-12, 2006. ET/DR&C is currently tasked by World Meteorological Organization's (WMO) Commission for Basic Systems (CBS) to develop XML guidance, practices, and any associated WMO standards for the representation and delivery of meteorological information using XML. The ET/DR&C recommended that CBS create a new Expert Team to tackle the XML standardization issue.

COLLABORATION WITH NAS/NRC BOARD ON ATMOSPHERIC SCIENCES AND CLIMATE

The OFCM continued its mutually beneficial interactions with the

National Academy of Sciences/National Research Council (NAS/NRC). The NAS/NRC Board on Atmospheric Sciences and Climate (BASC) conducted a strategic planning workshop on August 8-9, 2006, in which the Federal Coordinator for Meteorology participated.

COLLABORATION WITH THE COMMITTEE ON ENVIRONMENT AND NATURAL RESOURCES

CENR PRINCIPALS

The Federal Coordinator continued to be a participant on the CENR, and continued to assist CENR through review and concurrence of CENR reports and materials.

SUBCOMMITTEE ON DISASTER REDUCTION

The OFCM has been an active participant in the work of the CENR Subcommittee on Disaster Reduction (SDR). OFCM is committed to working with SDR to provide a forum for information sharing, development of collaborative opportunities, and interactive dialogue with the U.S. policy community to advance informed strategies for managing risks associated with natural and technological disasters.

AMERICAN METEOROLOGICAL SOCIETY

During FY 2006, the OFCM joined in supporting the new 2006/2007 American Meteorological Society (AMS) Freshman Undergraduate Scholarship Program. The scholarship program is open to all high school students and designed to encourage study in the atmospheric and related sciences. The OFCM also supports AMS endeavors by participating in AMS conferences and workshops and other environmental science education and outreach programs. In addition, an OFCM staff member is Chairperson of the AMS Weather Analysis and Forecasting Committee; Cochair of the 2007 AMS Annual Meeting to be held in San Antonio, Texas; and a member of the AMS Reichelderfer Award Committee.

INTERNATIONAL COLLABORATION

During FY 2005, the Federal Coordinator provided a comprehensive briefing on the OFCM and interagency coordination of federal meteorological activities to Dr. Xu Xiaofeng and a delegation of 25 individuals from the Chinese Meteorological Administration, on May 24, 2005. Then on August 24, 2005, the Federal Coordinator hosted and briefed Dr. Zheng Guoguang, Deputy Administrator of the Chinese Meteorological Administration. Also, news media from Japan attended and conducted interviews at the 59th Interdepartmental Hurricane Conference in Jacksonville, Florida, March 7-11, 2005.

PUBLICATIONS AND OFCM'S WEB SITE

The following publications were prepared in hardcopy form and/or have been placed on OFCM's Web site (www.ofcm.gov):

• *The Federal Plan for Meteorological Services and Supporting Research-Fiscal Year 2006*

• *National Winter Storms Operations Plan*

• *National Hurricane Operations Plan*

• *Federal Research and Development Needs and Priorities for Phased Array Radar*

• *Report of the Assessment Committee for the National Space Weather Program*

• *Weather Information for Surface Transportation-Update on Weather Impacts and WIST Results*

• *Federal Meteorological Handbook No. 1-Surface Weather Observations and Reports*

• *Federal Meteorological Handbook No. 11-Doppler Radar Meteorological Observations; Part A-System Concepts, Responsibilities and Procedures*

• *Federal Meteorological Handbook No. 11-Doppler Radar Meteorological Observations; Part B-Doppler Radar Theory and Meteorology*

• *Federal Meteorological Handbook No. 11-Doppler Radar Meteorological Observations; Part D-WSR-88D Unit Description and Operational Analysis*

During FY 2006, the OFCM continued to make substantial progress on its use of the Internet. In addition to information about the office, the OFCM has placed its current publications on its Web site, and keeps the Web site current with information regarding workshops and forums being conducted by the office. The OFCM will continue to make information available on the Internet during FY 2007.